

Development of Thermionic Energy Converter for Radioisotope Batteries

Final CRADA Report

Experimental Operations and Faciltiess Division

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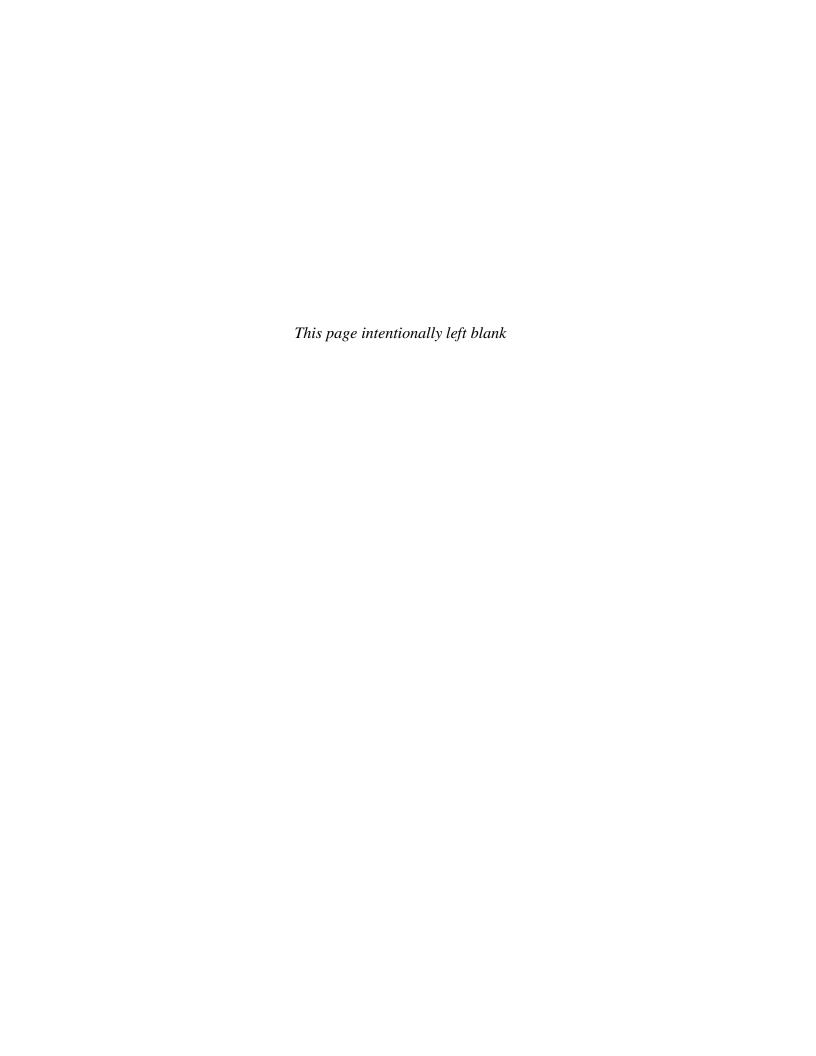
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prepared by Sergy Chemerisov EOF Division, Argonne National Laboratory

Participants: Atlas Energy Systems, LLC

9/23/19





Non Proprietary Final CRADA Report

For the Office of Scientific and Technical Information (OSTI)

CRADA Number: 17112

CRADA Title: Short-Form Cooperative Research and Development Agreement No. 17112

CRADA Start Date 6/12/2017 - **End Date** 6/12/2019

DOE Program or Other Government Support Program office: AMO Chain Reaction Innovations

Program manager name: John Carlisle

Program manager phone or email: Carlisle@anl.gov

Participant(s)

Participant 1 name: Atlas Energy Systems, LLC

Complete address: 1413 Sherman Road Suite 100 Romeoville, IL 60446

Participant 2 name: Click or tap here to enter text. Complete address: Click or tap here to enter text.

Participant 3 name: Click or tap here to enter text. **Complete address:** Click or tap here to enter text.

Argonne National Laboratory Argonne PI(s): Sergey Chemerisov

Funding Table

To add rows, right-click in bottom row and select "Insert" "rows above".

	Planned Funding	Actual Funding	In-Kind
Government	\$350,000	\$350,000	
Atlas Energy Systems, LLC	\$178,000	\$383,402	\$90,000
Enter Participant 2 here	\$	\$	\$
Enter Participant 3 here	\$	\$	\$
Total	\$528,000	\$733,402	\$90,000

Nature of Work

Describe the research (summary of Scope of Work and principal objectives of the CRADA):

Research and development of new energy materials for thermionic power generation for both nuclear and non-nuclear applications. Research focused on novel nuclear power generation materials in the form of advanced nuclear thermionic converters as well as general development of non-nuclear based thermionic power generation systems. Experiments were conducted at the Van de Graaf accelerator facility at Argonne and at Atlas own facility. Proof-of-principle experiments at Van de Graaff accelerator demonstrated feasibility of the technology for direct heat to electricity conversion. Further development of thermionic converter is conducted at Atlas facility. Argonne designed the universal testing bench for testing of different materials/coating/surface modified cathodes for thermionic energy conversion.

DOE mission area(s):

Energy and Environmental Science and Technology Materials Science National Security

Conclusions drawn from this CRADA; include any major accomplishments:

Major accomplishment was the demonstration of a new type of nuclear power generation technology that has no moving parts. Initial development proved fruitful but final conclusions point to further development being needed.

Technology Transfer-Intellectual Property Argonne National Laboratory background IP:

None

Participant(s) background IP:

Participant background IP is listed on the CRADA document

Identify any new Subject Inventions as a result of this CRADA:

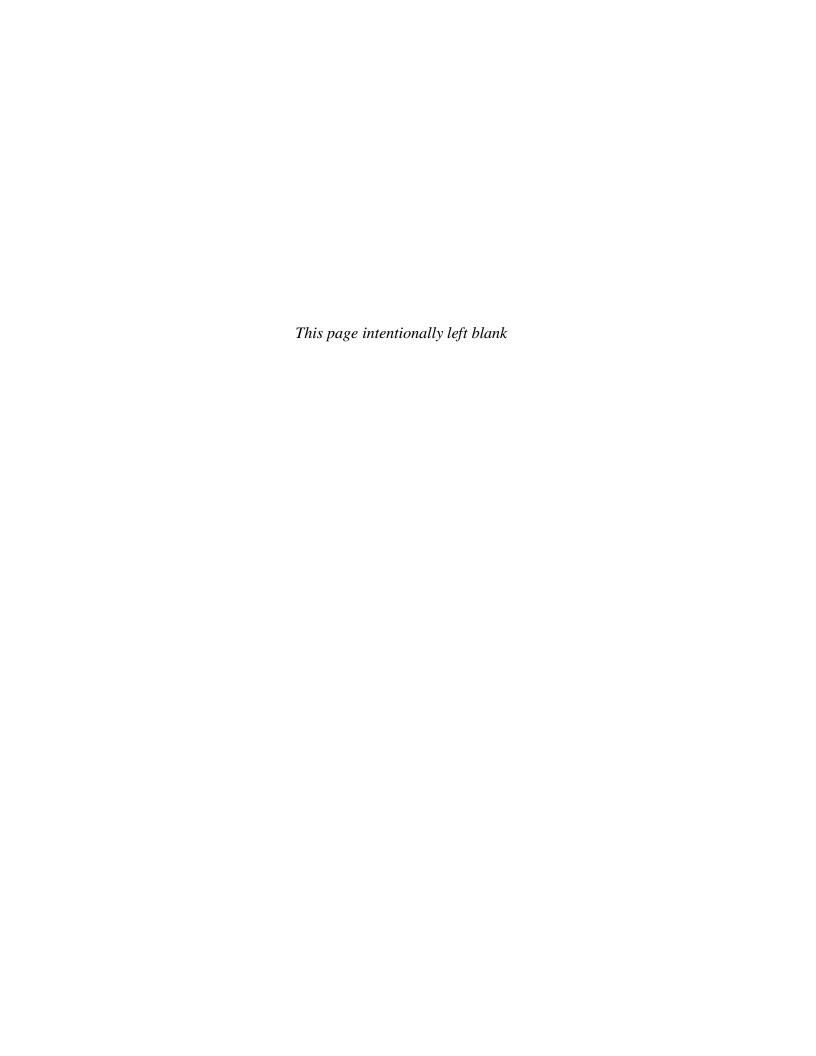
None, the Participant's concepts were patented prior to the start of the CRADA

Summary of technology transfer benefits to industry and, if applicable, path forward/anticipated next steps towards commercialization:

Technology maturation and development provided proof-of-concept data needed for application to larger funding opportunities. These funding opportunities are being pursued jointly with Atlas and Argonne.

Other information/results (papers, inventions, software, etc.):

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Nuclear Engineering Division

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